BROOKHAVEN NATIONAL LABORATORY

ENVIRONMENT, SAFETY, AND HEALTH STANDARD

IDENTIFICATION OF PIPING SYSTEMS	*1.14.0*

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Approved by: _____
M.S. Davis, Associate Director

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Revision 1

I. INTRODUCTION

Personnel injury and property damage have occurred because of mistakes made in identifying contents of piping systems. Universal schemes for identifying the contents and directional flow by legends, and color coding have been established so that personnel errors are minimized.

II. SCOPE

This Standard establishes a uniform system for the identification of liquids and gases conveyed in new piping systems, or where applicable, in piping systems which are not presently labeled.

Buried piping and electrical conduit are not covered by this Standard. In those buildings which are intended to contain only domestic water, sanitary lines, storm lines, sprinkler lines and building heating systems, the piping need not be identified in accordance with this Standard. Existing piping above ceilings need not be identified.

III. REFERENCES

ANSI A13.1 (latest) - Scheme for the Identification of Piping Systems

ANSI Z53.1 (latest) - Safety Color Code for Marking Physical Hazards

IV. DEFINITIONS

Asphyxiant is a material that displaces oxygen or reduces the blood's capacity to transport oxygen.

Chemically reactive or toxic materials are substances which are hazardous because they are corrosive, toxic, or productive of poisonous gases.

Extreme temperatures or pressures are materials having temperatures above 120°F(49°C) or pressures more than 40psia.

Fire extinguishing agents include water, chemical foam, CO_2, Halon, etc., used for fire suppression.

Flammable/explosive materials are any liquid with a flash point of less than 400° F (204° C) or any gas which forms a flammable mixture with air at atmospheric pressure.

Nonpotable water is water not suitable for drinking.

Piping systems include pipes, fittings, valves and pipe coverings.

Radioactive Material See BNL Radiological Control Manual.

V. RESPONSIBILITIES

A. ***Department Chairmen/Division Heads*** or their designees are responsible for ensuring implementation of this Standard.

B. ***Department/Division ES&H Coordinators*** and/or their designee are responsible for ensuring piping systems are in compliance with this Standard.

C. ***Line Supervisors*** for direct implementation of this Standard. Specifically, the Line Supervisor who is responsible for maintaining the system shall ensure that all piping systems within his jurisdiction are coded in accordance with provisions of this Standard.

D. ***The Safety and Environmental Protection (S&EP) Division*** is responsible for assisting Departments/Divisions in implementation of this Standard. The S&EP Representatives are responsible for auditing piping systems in compliance with this Standard.

E. ***The Project Group or Plant Engineering Division*** is responsible for ensuring identification of newly constructed piping systems in accordance with provisions of this Standard.

VI. REQUIREMENTS

All new piping systems require positive identification. This shall be accomplished by two concurrent means; legends, identifying the contents and directional flow, and by color coding.

A. **Legend**

l. The contents of a piping system shall be identified by a legend. The full name of the contents should be used as shown by examples given in the Appendix, Table l.

2. Arrows shall be used to indicate directional flow. Where flow is multidirectional, double headed arrows are to be used.

3. Materials having temperatures above 120°F (49°C) or pressures more than 40 psia, except domestic water, building heating and distribution systems, sanitary lines, and storm lines shall have legends indicating those temperatures and pressures.

4. Where unusual hazards exist with the materials, appropriate warnings shall be included with the legends. For greatest effectiveness, the information should be brief and informative.

5. Legends shall be applied close to valves, and adjacent to places where pipes change direction, branch or pass through walls, floors, or roofs. Legend intervals shall not be greater than 25 feet (7.6m.) on straight pipe runs.

6. Insulated pipe that is electric or steam traced shall have an appropriate legend identifying the tracing.

7. Legends may be stenciled on, taped on, snapped on, or strapped on.

B. **Color**

Colors shall be used to identify the characteristic properties of pipe contents in accordance with Appendix, Table 2. Color fields may be used in continuous total length coverage or in intermittent displays associated with the legend.

C. **Visibility**

Where pipe lines are located above the normal line of vision, lettering shall be placed below the horizontal center line of the pipe for best visibility. (Appendix, Figure l.)

D. **Type and Height of Letters**

Maximum contrast shall be provided between color field and legend for readability. The use of bold Gothic letters will provide high readability. Specific letter height recommendations are given in Appendix, Table 3. For pipes less than 3/4 inch (l9 cm) in diameter, and for valve fitting identification, a permanently legible engraved or embossed metal tag with block lettering not less than l/2 inch (12.7 mm) high shall be used.

APPENDIX

TABLE l

Examples of Legend

AIR 100 PSIG	CAUSTIC
ARGON 500 PSIG	STEAM 100 PSIG
PROPANE	HYDRAULIC OIL
HYDRAULIC OIL	H.P. RETURN
FUEL OIL	SLURRY
FOAM	SULFURIC ACID

TABLE 2

Typical Classification of Materials and Designation of Colors[1]

Classification	Color Field	Color of Letters for Legend
Materials Inherently Hazardous		
Asphyxiant	Yellow	Black
Flammable or Explosive	Yellow	Black
Chemically Active or Toxic	Yellow	Black
Temperatures above 120°F (49°C)	Yellow	Black
Compressed gas above 40 psia	Yellow	Black
Radioactive[2]	Yellow	Black or Magenta*
Materials of Inherently Low Hazard		
Liquid or Liquid Admixture[3]	Green	White
Gas or Gaseous Admixture	Blue	White
Fire Extinguishing Agents		
Water, Foam, CO2, Halon, etc.	Red	White

Notes:
[1]When the color scheme above is used, the colors should be as recommended in ANSI Z53.1 latest revision, Safety Color Code for Marking Physical Hazards.
[2]The colors should comply with the BNL Radiological Control Manual.
[3]Markers with black letters on a green color field are acceptable if already installed and/or until existing supplies are depleted.
* Magenta preferred.

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Table 3
Size of Legend Letters

Nom. Diameter of Pipe or Covering		Minimum Length of Color Field		Height of Letters	
inch	mm	inch	mm	inch	mm
3/4* to 1-1/4	19 to 32	8	200	½	13
1-1/2 to 2	38 to 51	8	200	3/4	19
2-1/2 to 6	64 to 190	12	300	1-1/4	32
8 to 10	200 to 250	24	600	2-1/2	64
over 10	over 250	32	800	3-1/2	89

*For pipes less than 3/4" diameter, see Sect. V.I.D.

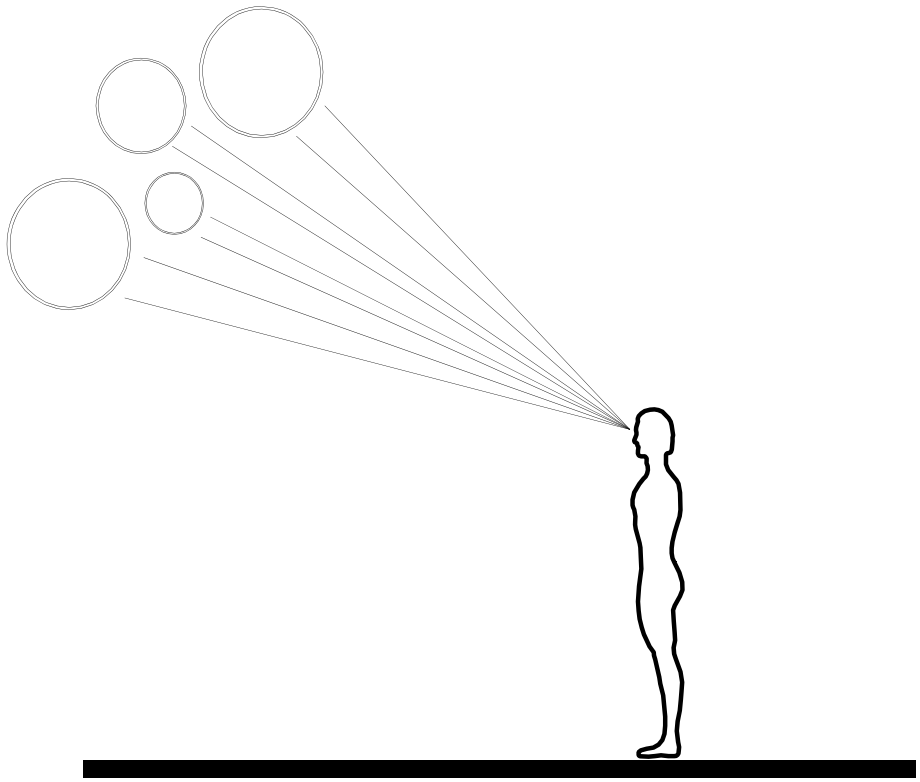

FIGURE 1